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ABSTRACT

The detrimental effects of test anxiety on knowledge acquisition as well as performance can occur by interfering with students' motivational tendencies and the use of effective cognitive and learning strategies. A promising conceptual approach to the constellation of student characteristics that may moderate the effects of test anxiety is self-regulation, the processes that maintain the cognition, affect, and behavior necessary to achieve intended goals. Self-regulation involves study environment management and the effort to regulate the learning process, securing academic success. This study examined the ways in which test anxiety and students' use of self-regulation relate to students' motivational tendencies, use of learning strategies, and academic performance. These relationships were examined by focusing on 429 college students who were low-, medium-, or high-test anxiety subjects and either low or high self-regulated learners. While definite relationships between test anxiety and self-regulation on students' motivation and use of learning strategies were found, moderating effects were not seen, at least as far as self-regulation was operationalized in this study. These findings suggest the need for additional studies of whether alternative ways to operationalize self-regulation may reveal moderating effects. (Contains 2 tables and 31 references.) (Author/SLD)

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The Relationship Between Test Anxiety and Self-Regulation on Students' Motivation and Learning

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Abstract

The detrimental effects of test anxiety on knowledge acquisition as well as performance can occur by interfering with students' motivational tendencies, use of effective cognitive and learning strategies. A promising conceptual approach to the constellation of students' characteristics that may moderate the effects of test anxiety is self-regulation. Self-regulation refers to the processes which maintain the cognition, affect, and behavior necessary to achieve intended goals. It involves study environment management and the effort put forth to regulate the learning process securing academic success. We examined the ways in which test anxiety and students' use of self-regulation relate to students' motivational tendencies, use of learning strategies, and academic performance. We examined these relationships by focusing on participants who were either low, medium, or high test anxious students and at the same time were either low or high self-regulated learners. We found that while there are definite relationships between test anxiety and self-regulation on students' motivation and use of learning strategies, moderating effects are not present, at least as self-regulation was operationalized in the present study. The present findings suggest the need for additional studies that are conducted to permit an independent assessment of whether alternative ways to operationalize self-regulation results in the moderating effects may exist.

The Relationship Between Test Anxiety and Self-Regulation on Students' Motivation and Learning

In the study of students' academic performance, motivation, and leaning, it is necessary to consider the affective components that influence the learning process (Hattie, Biggs, & Purdie 1996; McKeachie, 1951; Pintrich & De Groot, 1990). One affective component is test anxiety (Pintrich, Smith, García, & McKeachie, 1993), which has two subcomponents: emotionality and cognition (Hofer, Yu, & Pintrich, 1998; Liebert & Morris, 1967; Spielberger, Anton & Bedell, 1976; Spielberger & Vagg, 1995). The emotionality subcomponent refers to physical arousal during performance. The cognitive component refers to the worry that interferes with attention, concentration, and effective information processing (Benjamin, McKeachie, Lin, Halinger, 1981; Naveh-Benjamin, McKeachie & Lin, 1987; Pintrich & Schunk, 1996; Spielberger & Vagg, 1995; Tobias, 1985), which can be detrimental to knowledge acquisition as well as performance. Among the two components of test anxiety, worry rather than emotionality has been identified as having the most pervasive effect on academic performance, (Bedell & Marlowe, 1995; Pintrich & Schunk, 1996; Spielberger, 1980).

The detrimental effects of test anxiety on knowledge acquisition can occur by interfering with students' use of effective cognitive strategies such as elaboration, rehearsal, and organization. Further, test anxiety may adversely affect performance by reducing students' motivation for learning. For example, high test anxious students may decrease their level of expectancy for success and lead them to defensively devalue important learning outcomes.

Although the detrimental effects of test anxiety have been well established, anxiety's influence is likely to be moderated by other student characteristics. Anxiety may not be detrimental, for example, when students are highly motivated to achieve and/or have at their disposal and employ strategies that ameliorate anxiety's negative influence. Such moderating effects have not been extensively investigated.

A promising conceptual approach to the constellation of student characteristics that may moderate the effects of anxiety is self-regulation. Self-regulation refers to the processes which maintain the cognition, affect, and behavior necessary to achieve intended goals (Schunk & Zimmerman, 1997). It involves study environment management and the effort put forth to regulate the learning process securing academic success. For example, a student with self-regulated learning skills expends more effort and exert more control over her study environment to influence her academic outcomes than a student with self-regulation deficiencies. Self-regulated learners may increase their effort to control their thoughts and affect to decrease self-distraction. Corno (1989; 1993) defined this type of self-regulation as volitional control to maintain intentions in the presence of distracting stimulus. Likewise, Bembenutty and Karabenick (1996) found that self-regulation of effort is associated with students' preference for academic delay of gratification, a self-regulatory strategy, in order to obtaining higher final course grade. Furthermore, control over the study environment is important to learners who are trying to excel

in education. Kuhl (1985) includes environmental control as an important process that mediate action control in pursuing intentions. For example, a self-regulated learner would select a less distracting environment concentrating on homework. She may disconnect the telephone temporarily, or turn off the television set. Taken together, it appears that self-regulation may moderate the effects of anxiety by influencing both students' use of learning strategies and motivation.

Test anxiety is negatively related to students' use of cognitive strategies (Naveh-Benjamin, McKeachie, Lin, & Holinger, 1981; Naveh-Benjamin, McKeachie, & Lin, 1987; Tobias, 1985, 1992). Cognitive strategies include rehearsal, elaboration, organization, critical thinking, and metacognition (Pintrich, Smith, García, & McKeachie, 1993). Naveh-Benjamin, McKeachie, & Lin (1987) report that anxiety interferes with rehearsal during an examination. Thus, test anxiety may interfere with students' use of cognitive and metacognitive strategies which are important strategies in pursue of academic goals. In addition, test anxiety may impair cognition in such a way that learners set difficult goals which are impossible to accomplish (Naveh-Benjamin, McKeachie, & Lin, 1987). At issue here is whether students' level of self-regulation moderates these effects.

Motivation plays an important function in students' academic performance (García & Pintrich, 1994; Deci & Ryan, 1985; Pintrich & Schunk, 1996; Wigfield, 1994), and thus students' motivational tendencies should be negatively associated to students high level of test anxiety and positively related to students' use of self-regulation of learning. For example, students highly motivated for learning may put effort to enacting and maintaining high levels of expectancy for success, self-efficacy, and competence during an examination and consequently decreasing the adverse effect of test anxiety. Likewise, a highly motivated student with self-regulated proficiencies not only chooses to study in a less distracting environment, but she also may remain there to be certain that she will finish an assignment that is due the next day rather than leave without finishing the assignment to have fun with her friends.

An important motivational factor relating to learning is task value, which refers to how important, interesting, and useful students perceive academic tasks (Eccles, 1983; Pintrich & De Groot; Pintrich, Smith, García, & McKeachie, 1993). Task value is related to self-regulation and academic performance (Pintrich & De Groot, 1990). Task value is negatively related to test anxiety (Eccles, 1983) and it should be positively related to students' use of effort and study management. Another important motivational factor is self-efficacy. Self-efficacy is related to successful academic performance (Bandura, 1982, 1986; Schunk, 1994; Zimmerman, 1994, 1995). Students with high self-efficacy may decide to continue working on an important assignment when test anxiety arises and when a temptation to stop. However, students with low self-efficacy beliefs may not only succumb to a temptation, they may let disruptive thoughts interfere with performance.

As with learning strategies, we ask whether students' degree of self-regulation will influence the effects of anxiety on students' motivation for learning. In the most relevant study to date, Williams-Miller (1998) reports that the association between self-regulation and motivation (specifically competence and autonomy), is

not affected by test anxiety. In contrast, Brackney and Karabenick (1995) found a negative correlation between test anxiety and students's use of effort regulation and time and study environment management which are two important self-regulatory strategies. The purpose of the present study was to further examine the ways in which test anxiety and students' use of self-regulation relate to students' motivational tendencies, use of learning strategies, and academic performance. We examined these relationships by focusing on participants who were either low, medium, or high test anxious students and at the same time were either low or high self-regulated learners.

Method

Participants and Assesment

Participants were 429 students enrolled in introductory courses in two Midwestern universities, a comprehensive college, and in a community college. Students responded to a version of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, García, & McKeachie, 1993). The MSLQ includes subscales that assess students' motivational tendencies (intrinsic and extrinsic motivation, task value, self-efficacy, competence, social desirability, control belief, and expectancy for success), affective motivation (test anxiety), and learning strategies, which include cognitive strategies (elaboration, rehearsal, organization, and metacognition), and resource management strategies (effort, time management, study environment management, and help seeking). Participants responded to the statements on a 7-point scale, ranging from 1 (*Not at all true of me*) to 7 (*Very much true of me*). For purpose of analysis, we created three test anxiety groups by dividing the distribution into low (N = 122), medium (N = 154), and high (N = 154) test anxious students. Because Chi-square tests indicated no association between anxiety and gender, we combined gender groups (χ^2 (2, N = 429) = 1.38).

Self-regulation was operationalized in the present study by adding the scores of effort regulation and study environment management. An item which represents the effort component of self-regulation is "Even when study materials are dull and uninteresting, I manage to keep working until I finish." An example representing the study environment management of self-regulation is "My primary place for studying is relatively quiet and has few distractions." For purposes of analysis, we divided the distribution at the median (4.8) creating low (N = 215) and high (N = 215) self-regulated students. Chi-square analyses comparing sex of participants with self-regulation showed no significant difference between the groups, χ^2 (1, N = 429) = 2.92, and thus gender groups were combined. As an indicator of academic performance we used students' final course grade, which was coded to range from E = 0 to A = 4.

Results and Discussion

To test our hypothesis, we used a MANOVA to study the main and interaction effects of test anxiety and self-regulation on students' motivation and use of learning strategies. An ANOVA was performed to asses the effect and interaction of

test anxiety and self-regulation on final course grade. Table 1 presents means and standard deviations for students' motivation, use of learning strategies, and final course grade as a function of test anxiety and self-regulation. The MANOVA indicated a significant main effect of test anxiety (F_{mult} = 5.91, $p < .001$) and self-regulation (F_{mult} = 15.98, $p < .001$). Subsequent univariate ANOVAs indicate that among the motivational dimensions, test anxiety has an effect on intrinsic and extrinsic motivation, self-efficacy, control beliefs, social desirability, competence, and expectancy for success. Among the learning strategies, test anxiety has an effect on rehearsal, organization, help seeking, and final course grade. However, the interaction (F_{mult} = 1.38, $p < .10$) based on conventional Type I error levels (i.e., alpha = .05) was no significant. As a consequence, the present results support William-Miller's (1998) conclusion that the relationship between motivation and self-regulation is not affected by test anxiety.

In summary, while there are definite relationships between test anxiety and self-regulation on students' motivation and use of learning strategies, moderating effects are not present, at least as self-regulation was operationalized in the present study. Although defensible based on the self-regulation literature, it must be admitted, however, that there is not universal agreement on this issue. That is, whereas some theorists focus their interpretation on action control, others include motivational components of self-efficacy and metacognition (e.g., Pintrich & De Groot, 1990; Schunk & Zimmerman, 1997). As a consequence, the present findings suggest the need for additional studies that are conducted to permit an independent assessment of whether alternative ways to operationalize self-regulation results in the moderating effects may exist.

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Table 1

Mean differences of test anxiety (TA) and self-regulation(SR) on students' motivation and use of learning strategies

MSLQ Scales	TA			SR	
	Low	Medium	High	Low	High
	N = 121	*N* = 154	*N* = 154	*N* = 215	*N* = 215
Motivation					
Intrinsic	5.64 (.82)	5.35 (.90)	5.58 (.85)	5.26 (.85)	5.77 (.81)
Extrinsic	3.43 (1.00)	3.75 (.91)	3.95 (1.02)	3.81 (1.03)	3.64 (.96)
Task Value	5.74 (1.19)	5.51 (1.13)	5.61 (1.06)	5.37 (1.16)	5.85 (1.04)
Self-Efficacy	5.22 (1.03)	4.98 (.99)	4.74 (1.02)	4.72 (.96)	5.21 (1.04)
Control Beliefs	5.40 (.72)	5.19 (.60)	5.15 (.65)	5.20 (.67)	5.28 (.64)
Social Desirability	3.55 (1.12)	4.20 (1.12)	4.73 (1.07)	4.59 (1.00)	3.82 (1.25)
Competence	4.75 (1.06)	4.62 (.95)	4.20 (1.07)	4.24 (.91)	4.77 (1.11)
Exp. for Success	5.49 (1.30)	5.27 (1.04)	4.95 (1.19)	4.96 (1.14)	5.47 (1.19)
Learning Strategies					
Rehearsal	4.97 (.77)	4.65 (.84)	4.10 (.86)	4.36 (.85)	4.73 (.91)
Metacognition	4.90 (.87)	4.66 (.77)	4.67 (.73)	4.39 (.71)	5.08 (.72)
Elaboration	4.31 (.99	4.41 (.93)	4.40 (.88)	4.07 (.81)	4.68 (.87)
Organization	5.50 (.86)	5.12 (.83)	4.80 (.86)	4.77 (.82)	5.46 (.82)
Time Manag.	4.01 (1.52)	3.89 (1.35)	3.60 (1.36)	3.10 (1.14)	4.54 (1.30)
Help Seeking	4.05 (1.28)	4.33 (1.25)	4.44 (1.25)	4.09 (1.20)	4.49 (1.31)
Final Grade	3.08 (.91)	2.76 (.91)	2.29 (1.02)	2.58 (1.02)	2.93 (.90)

Table 2

Multivariate analysis of main effects and interactions of Test anxiety (TA) and Self-regulation(SR) on students' motivation and use of learning strategies (N = 429)

MSLQ Scales	TA	SR	TA x SR
	Motivation		
Intrinsic	4.39*	36.76***	3.20*
Extrinsic	8.35***	2.00	0.21
Task Value	1.03	18.33***	0.11
Self-Efficacy	5.20**	22.12***	0.66
Control Beliefs	5.52**	0.94	0.89
Social Desirability	33.10***	42.12***	2.24
Competence	7.64**	27.56***	3.44*
Expectancy for Success	5.07**	19.21***	2.19
	Learning Strategies		
Rehearsal	37.02***	14.04***	4.12*
Metacognition	1.58	92.96***	1.25
Elaboration	2.41	57.74***	1.38
Organization	16.97***	63.60***	1.22
Time Management	1.19	140.23***	1.92
Help Seeking	4.63*	13.52***	1.82
Final Course Grade	11.29***	8.99**	1.80

*$p < .05$ **$p < .01$ ***$p < .001$

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